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Impact of shelterbelts of different age on the content of nitrates and phosphates in ground water

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The investigations were carried out in the Agroecological Landscape Park situated 40 km South-West of Poznań in the upper Obra River watershed, Poland. The arable land constitutes 70%, shelterbelts and small afforestations about 14% and meadows and pastures about 12%.

Shelterbelts belong to very efficient biogeochemical barriers. They decrease the migration of chemical compounds between ecosystems. The direction of ground water flow was from the adjoining cultivated field towards shelterbelts.

Two shelterbelts of different humus guantity in surface layer soils were investigated. The age and species composition of plant was taken under consideration.

The first one is 160-year-old shelterbelt, where predominant species is *Robinia pseudoacacia*, *Quercus rober* and *Alnus glutinosa* and is characterized by a well-developed humus level. The other one is 14-year-old shelterbelt. It includes 13 species of trees (*Quercus petrea, Larix deciduas, Pinus silvestri, Populus nigra, Sorbus aucuparia)* and reveals a small amount of humus.

The soils are minerals, grey-brown podzolic in surface layer soils compound from light loamy sands and weakly loamy sands.

The contents of N-NO_3^-, P-PO_4^{-3}, were investigated in the ground water under shelterbelts and adjoining cultivated fields. In addition, cationic sorptive capacity, specific surface areas, TOC were determined in soils.

The smallest concentrations of nitrates (3.35 mg·l^{-1}) and phosphates (0.02 mg·l^{-1}) were observed in ground water under the 160-year-old shelterbelt.

The physicochemical properties of soils under 160-year-old shelterbelt: specific surface areas (20.3 $m^2 \cdot g^{-1}$), cationic sorptive capacity (24.8 cmol(+)·kg^{-1}), TOC (4.3%) was higher than in 14-year-old shelterbelt and in adjoining cultivated fields.

The results revealed, that the 160-year-old shelterbelt characterizing developed humus more effectively than 14-year-old shelterbelt decreases the amounts of chemical compounds in ground water and sufficiently fulfils the function such as biogeochemical barrier in agricultural landscape.

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